Virginia Water Withdrawal Reporting Regulation (VWWR)
Agricultural Production and Crop Irrigation
Estimating Raw Water Withdrawals

ESTIMATING RAW WATER WITHDRAWALS FOR **IRRIGATION***

*threshold for reporting agricultural irrigation: 1 million gallons or more in a single month
*threshold for reporting non-agricultural irrigation: average of 10,000 gallons or more per day during any single month

Method 1: Using inches of irrigation

For sprinkler irrigation, if you keep track of the depth of irrigation water you apply to your fields in inches, you can record this value each month. Several inexpensive rain gages located in the irrigated field can give you the most accurate measure of inches applied. Your local Cooperative Extension Agent can be of assistance if you need additional help (https://ext.vt.edu/offices.html).

(ACRES IRRIGATED x DEPTH IN INCHES APPLIED) x (NUMBER OF TIMES PER MONTH) / 37
= WATER USE PER MONTH in MILLION GALLONS

Examples:

- During July, 19 cropland acres are irrigated twice at a rate of 1 inch per acre:
  (19 x 1) x 2 / 37 = **1.0 million gallons** of irrigation for the month of July

- A producer irrigates 12 acres per day for 12 days during the month of August. The crops are irrigated at a rate of 2 inches per acre:
  (12 x 2) x 12 / 37 = **7.8 million gallons** of irrigation for the month of August

Method 2: Using hours of pumping

A second method which can be used is to record the operating time of the pump and power unit during each month of the irrigation season. You will also need to know the flow rating of your pump in gallons per minute (GPM) which will be noted somewhere on the pump itself, the pump panel, or in the literature provided. A timing meter installed at your pumping station can give you exact operating time, although taking note of elapsed running time with a smartphone or wristwatch is an adequate measure. Your local Cooperative Extension Agent can be of assistance if you need additional help.

(PUMPING HOURS x PUMP GPM) / 16,667 = WATER USE PER MONTH in MILLION GALLONS

Examples:

- A 100 GPM pump is used to irrigate crop fields over 14 days in June. The pump is operated approximately 12 hours per day:

  (14 days x 12 hours per day) = 168 hours,
  (168 hours x 100 gpm) / 16,667 = **1.0 million gallons** of irrigation for the month of June

- In September a producer irrigates 18 days using a 230 GPM pump. The pump is operated approximately 10 hours per day:

  (18 days x 10 hours per day) = 180 hours,
  (180 hours x 230 gpm) / 16,667 = **2.5 million gallons** of irrigation for the month of September

Method 3: Using a flow meter

A recording flow meter will provide the most accurate measure of water use. Your recorded use may be either in gallons or cubic feet.

GALLONS METERED PER MONTH / 1,000,000 = WATER USE PER MONTH in MILLION GALLONS

- OR –

CUBIC FEET METERED PER MONTH / 133,681 = WATER USE PER MONTH in MILLION GALLONS

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*threshold for reporting: average of 10,000 gallons or more per day during any single month

Method
For livestock drinking water withdrawals, use the charts below to estimate monthly water consumption according to livestock type. Please record in the comments section of the water withdrawal reporting form, the water consumption amount(s) used in your estimation.

WATER USE PER MONTH in GALLONS =
(LIVESTOCK CONSUMPTION in GALLONS PER DAY) x (# OF LIVESTOCK) x (# DAYS in MONTH)

WATER USE PER MONTH in MILLION GALLONS =
WATER USE PER MONTH in GALLONS / 1,000,000

Estimated water needs for grazing livestock during average and hot weather. (From Virginia Cooperative Extension Service Publication Number 442-130, May 2009)
https://ext.vt.edu/content/dam/pubs_ext_vt_edu/442/442-130/442-130(BSE-247P).pdf

Livestock Type	Average Consumption (gal/animal/day)	Hot Weather Consumption (gal/animal/day)
Lactating dairy cow	20 to 25	25 to 40
Dry dairy cow	10 to 15	20 to 25
Dairy calf	4 to 5	9 to 10
Lactating beef cow	12 to 18	20 to 25
Dry beef cow	8 to 12	15 to 20
Feeder calf	10 to 15	20 to 25
Sheep	2 to 3	3 to 4
Horse	8 to 12	20 to 25

Provision of Water for Swine. (From Virginia Cooperative Extension Service Livestock Update, July 2006) http://www.sites.ext.vt.edu/newsletter-archive/livestock/aps-06_07/aps-349.html

Class of Swine	Water Consumption (gal/animal/day)
Nursing Piglets (up to 60 lbs)	0.07 to 0.3
Grower Pigs (60-100 lbs)	0.5 to 1.3
Finisher Pigs (100-250 lbs)	1.1 to 2.6

Examples:

- A farm has 335 milking cows. The producer estimates the average consumption rate is 30 gal/cow/day in the month of May: 30 gallons x 335 = **10,050 gallons per day** in the month of May, meeting the threshold for reporting over the entire year. The total water use for the month of May is then estimated as: 10,050 gallons x 31 days = **311,550 gallons** or **0.312 million gallons**.

- Approximately 1200 calves in a feedlot receive drinking water from frost proof fountains supplied by well water. The producer estimates the average consumption rate is 15 gal/calf/day in the month of October: 15 gallons x 1200 = **18,000 gallons per day** in the month of October, meeting the threshold for reporting over the entire year. The total water use for the month of October is then estimated as: 18,000 gallons x 31 days = **558,000 gallons** or **0.558 million gallons**.

Management Requirements for Meat Bird and Laying Flocks. (From Virginia Cooperative Extension Service Fact Sheets #2902-1085 & #2902-1083, 2009)

Poultry Type	Average Consumption (gal/animal/day)
Chickens-Meat	0.06
Chickens-Layer	0.05

Water Needs for Poultry – Are you Prepared? (From Pennsylvania Cooperative Extension Fact Sheet, March 2002) http://www.personal.psu.edu/gpm10/factwater.pdf

Turkey Age (weeks)	Average Consumption (gal/animal/day)
1	0.01
2	0.02
3	0.03
4	0.04
5	0.05
6	0.06
7	0.075
8	0.095
9	0.115
10	0.125
12	0.150
15	0.160
20+	0.170

**The information in the charts above is provided for your reference. Water consumption rates may differ depending on many variables including, but not limited to temperature, feed consumption, animal stress, lactation stage, and type of waterer.

Example:

- A farm uses wells to supply 7 poultry houses, each holding approximately 25,000 broilers in the month of December.
  7 houses x 25,000 broilers = 175,000 broilers total
  175,000 x 0.06 gallons per bird per day = **10,500 gallons per day** in the month of December, meeting the threshold for reporting over the entire year. The total water use for the month of December is then estimated as: 10,500 gallons x 31 days = **325,500 gallons** or **0.325 million gallons**.

Other Agricultural Water Withdrawals to be Considered

In addition to livestock consumption, other on-farm water uses may need to be considered in order to obtain a complete agricultural water withdrawal number. Consider the questions below to determine if these withdrawals need to be added to your farms' agricultural water withdrawal estimates each month.

- Is water used for livestock cooling? If so, estimate the amount of water used for cooling each month and add it to the agricultural total for the corresponding month.

- Is raw water used for farm waste management? If so, estimate the amount of water used on a monthly basis for practices such as manure management and parlor washing and add it to the agricultural total for each month. Remember, do not count waste management water that is recycled.